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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/037,808	01/03/2002	Eric G. Dow	79530	6243

7590 05/05/2004

Office Of Counsel, Bldg 112T  
Naval Undersea Warfare Center  
Division, Newport  
1176 Howell Street  
Newport, RI 02841-1708

EXAMINER

MERCADO, JULIAN A

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/037,808	Applicant(s) DOW ET AL.	
	Examiner Julian Mercado	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-4, 6, 7, 10-13 and 16-19 is/are rejected.
- 7) ☒ Claim(s) 5, 8, 9, 14 and 15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Drawings*

Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

1. Reference sign "34" directed to the cathode should be changed to "36". The examiner notes that there appears to be two instances of reference sign "34". From left to right in Figure 3, the leftmost appears to be the cathode while the rightmost appears to be the anode (in view of separator "44" being in contact therewith consistent with page 11 of the specification at lines 3-4).
2. Reference sign "47" is not found in any of the drawings. This feature appears to be drawn to the cathode surface as disclosed in the specification on page 11 line 46.

The drawings are objected to because Figure 3 appears to show the first surface [37] as being the *lateral side surface* of the anode and not the surface which is disclosed to be in mutual contact with member [38]. See specification on page 10. It is suggested to revise the "squiggly line" from reference numeral 37 to point to the surface of the anode directly opposite reference numeral 42.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Art Unit: 1745

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11 and 19 recite the limitation “concentration is in the range of from about 0.001% to about 70%”. This limitation is considered indefinite as the units of concentration, e.g. molar, % by weight, % by volume etc.” are not recited in the claim. A review of the specification was not found to remedy or give breadth and scope to this limitation.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 16 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Struthers (U.S. Pat. 4,492,741).

See col. 5 line 12-16 and line 54-58 and col. 6 line 51-59. The claimed “preventing contact between each respective anolyte stream and each respective catholyte stream” is considered shown by the intervening Ionolyte or Ion Exchange section [Y].

Art Unit: 1745

Claims 1-4, 6, 10-12, 16, 17 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Marsh et al. (U.S. Pat. 5,445,905).

Regarding independent claims 1, 15, 16 and dependent claims therefrom as noted, Marsh teaches a semi-fuel cell stack comprising a housing, within which is an anode [12], a porous cathode [14], and an aqueous catholyte and anolyte stream. (col. 4 line 30-35, Figure 1) The cathode is considered to be comprised of two elements: 1) the cathode body itself, which is preferably nickel, and 2) the electrocatalytic coating material in contact therewith, i.e. the porous cathode is "preferably nickel coated with a material electrocatalytic to  $H_2O_2$  reductions such as platinum, iridium, palladium, or a combination such as Ir and Pd", *inter alia*. (col. 4 line 6-8, also applies to dependent claims 2, 3 and 6) The electrocatalytic material is considered to anticipate the claimed "means for preventing migration" of the catholyte insofar as the hydrogen peroxide solution,  $H_2O_2$ , as the catholyte is reduced to hydroxide as it passes through the porous cathode, "[a]ll hydrogen peroxide 18 must pass through the porous cathode 14 where it is reduced to hydroxide prior to entering the anodic compartment". (col. 4 line 33-35) The reduction of hydrogen peroxide into hydroxide reads on the claimed "inhibiting the transfer of hydrogen peroxide" (applies to dependent claim 17) and the claimed "preventing contact" between the anolyte stream and the catholyte stream (applies dependent claim 16)

As to dependent claim 10, the anolyte is an NaOH/seawater electrolyte, *inter alia*. (col. 3 line 59-66)

With respect to dependent claims 11 and 19, to the extent that the scope of this claim may be interpreted by the examiner the  $H_2O_2$  in Marsh et al. is disclosed at a preferred

Art Unit: 1745

concentration of 0.5 to 1.5 molar which overlaps with applicant's claimed 0.001% to about 70% (when converted to molar and assuming applicant is claiming gram/volume percentages)

Regarding dependent claim 12, the anode is formed of aluminum, *inter alia*. (col. 3 line 44 et seq.)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 above.

The teachings of Marsh et al. are discussed above.

Regarding dependent claim 4, the claimed "material impregnated into said porous cathode" has not been given patentable weight as the impregnation step does not give breadth or structural scope to the porous cathode, to this extent, the catalyst material coating the nickel cathode body appears to be the same or similar to the prior art product insofar as the prior art's porous cathode structure similarly functions as a means for migration prevention of the catholyte therethrough. Any differences that may be shown between a nickel/platinum coated cathode and one that has material impregnated would have been obvious to the skilled artisan as a routine

Art Unit: 1745

modification of the product absent of a showing of unexpected results. *In re Thorpe*, 227 USPQ 964 (Fed. Cir. 1985).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 above in view of Pellegrini et al. (U.S. Pat. 6,475,661 B1)

The teachings of Marsh et al. are discussed above.

Marsh et al. does not explicitly teach a carbon fiber matrix. However, Pellegrini et al. teaches a carbon fiber matrix as part of the electrode structure. (col. 11 line 60 et seq.) The skilled artisan would find obvious to modify Marsh et al. by employing a carbon fiber matrix for reasons such as providing for a sufficiently larger active area. (Pellegrini et al., col. 12 line 1-3)

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 in view of Medeiros et al. (U.S. Pat. 6,228,527 B1)

The teachings of Marsh et al. are discussed above.

Marsh et al. does not explicitly teach an aqueous sodium hypochlorite solution for the catholyte. However, the skilled artisan would find obvious to substitute sodium hypochlorite for hydrogen peroxide in view of Medeiros et al.'s teaching that these catholytes are well-known art-recognized equivalents. (col. 1 line 34-48)

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 in view of Hashimoto et al. (U.S. Pat. 4,614,693)

The teachings of Marsh et al. are discussed above.

Marsh et al. does not explicitly teach a hydraulic pressure greater for the catholyte greater than the anolyte. However, Hashimoto et al. teaches a similar pressure differential arrangement for a redox flow battery in which "the electrolyte pressure in the positive electrode chambers is higher than that of the negative electrode chambers". (col. 3 line 30-41) Thus, the skilled artisan would find obvious to employ a hydraulic pressure greater for the catholyte greater than the anolyte in order to enhance utilization of the electrolyte. (Hashimoto et al., *ib*)

#### ***Allowable Subject Matter***

Claims 5, 8, 9, 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 5, the prior art of record and to the examiner's knowledge do not teach or make obvious a migration preventing means comprising a membrane. As discussed above, the closest prior art teaching as shown by Marsh et al. teaches an electrocatalytic coating on a porous cathode body.

Regarding claims 8, 9 and 14, the prior art of record and to the examiner's knowledge do not teach or make obvious a plurality of flow channels or means for creating a plurality of flow channels for the catholyte attached to the anode. The examiner notes that Figure 3 illustrates the flow channels [40] as being attached to both the means for preventing migration [46] on its "open channel" side and attached to the anode on its other side. While Marsh et al. may be interpreted to teach a plurality of flow channels [30] and [32], these channels are not disclosed as



Art Unit: 1745

being attached to the anode [12]. Instead, these channels are disclosed as being as "spacers" which are "held in a fixture" and readily appreciated to be distantly apart from both the cathode and anode. (col. 4 line 45-50)

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian Mercado whose telephone number is (571) 272-1289. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



  
Patrick Ryan  
Supervisory Patent Examiner  
Technology Center 1700